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AN 
INAUGURAL
*DISSE*RTATION

ON

—
TETANUS,

By WILLIAM COCKE.

OF

—
G E O R G I A.

18256

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A N

Inaugural Dissertation

O N

T E T A N U S,

SUBMITTED TO THE

EXAMINATION

OF THE

Rev. John Ewing, S. T. P. Provost:

THE

T R U S T E E S

AND

Medical Faculty

OF THE

UNIVERSITY of PENNSYLVANIA,

ON THE 22nd. DAY OF MAY 1798.

FOR THE

D E G R E E

OF

DOCTOR OF MEDICINE,

By WILLIAM COCKE, of GEORGIA,

MEMBER OF THE PHILADELPHIA
MEDICAL SOCIETY.

TO
DR. DENNIS SMELT,
OR
Augusta, Georgia.

SIR,

PERMIT me to dedicate to you the following dissertation, the first fruits of a study commenced under your care; as a small testimony of gratitude and esteem from your sincere friend and former pupil.

WILLIAM COCKE.

INTRODUCTION.

THE publication of an Inaugural Essay, has been very generally one of the difficult and perplexing tasks, imposed upon candidates for a degree in medicine; and it is readily perceivable, that such a task was instituted rather for the purpose of affording a specimen of the student's application in acquiring the fundamental principles of the different branches of medicine, than for the purpose or opportunity it might give of obtruding into the world any thing new or interesting.

THE original object of these productions, has been exemplified in most Inaugural Dissertations; whatever pretensions the authors thereof may claim to originality, as we find very few principles in them which are not derived from some other source, only perhaps with some slight and uninteresting modification.

IN selecting *TETANUS*, as the subject of a Thesis, I have been influenced by neither, its

its very frequent prevalence in this country nor by any ability to communicate any thing new upon it; but rather by its own intrinsic importance and severity when it does appear, the opportunity it affords of recommending a remedy too much neglected or too little known, and that I might in some way discharge a disagreeable but cheerfully undertaken task.

ON

T E T A N U S.

THIS very painful, and too often fatal disease, was well known to the ancients, and is described with a considerable degree of accuracy by *Hippocrates**; who attributes its production principally to wounds.

Since his time, we find it described by a variety of authors, under the appellations of *Tetanus*, *Emprosthotonos*, *Opisthotonos*, *Pleurosthotonos*, &c. names expressive rather of the different inflexions of the body, than of any material variety with respect to the disease itself.

Although this disease may, and does occasionally occur in every climate; yet it appears to be chiefly confined to the more southern latitudes: so much so indeed that it has been supposed by some to be endemic in these situations.

Doctors Lind, Hillary, and Moseley†, all speak of it as being common in the West-Indies; and Doctor Girdlestone gives us a truly extraordinary instance of the se-

* *Opera. lib. III. De Morbis.*

† Lind on Hot Climates. Hillary's Observations on the Diseases of Barbadoes, Moseley on Tropical Diseases,

verity of this disease as it appeared among the British troops at Madras, in October 1782‡.

It is by no means uncommon in the southern parts of the United States, particularly during the warm season.

In South Carolina Doctor Chalmers has described it as frequently appearing throughout the year; but particularly in the summer§.

In Georgia, it is not an unfrequent complaint, as I saw several cases of it during the time I prosecuted the study of Medicine in that State.

With respect to the influence of heat, on the production of the present disease, we shall speak more fully hereafter.

The disease is, for the most part, gradual in its attack; discovering itself at first by more or less rigidity of the muscles of the neck, attended with an uneasy sensation about the root of the tongue. These sensations exist, in some instances for two or three days, without any alarming symptoms. The disease in other instances however, comes on more suddenly; and often runs its course in 24, 36 or 48 hours*.

In the usual form of the occurrence of the disease, the stiffness of the neck continues to increase, rendering the motion of the head more or less painful and difficult.

The painful sensation at the root of the tongue, is sometimes very considerably augmented, producing a difficulty

‡ *Essay on the Spasmodic affections of India*, page 51. 2d vol. Medical Pamphlets.

§ *An Account of Opisthotonus and Tetanus*, by Doctor Lionel Chalmers, of Charleston, S. C. 1st vol. London Med. Obs. and Inq. page 87.

* Chalmers, page 92. Girdlestone, page 54.

ficulty of swallowing in a greater or less degree. With the continuance and increase of these symptoms, the patient becomes affected with a severe pain at the *Scrofululus Cordis*; shooting in many instances towards the back.

A nausea and vomiting are frequent symptoms in the commencement of the disease; particularly in such cases as arise from cold succeeding heat. These symptoms are rarely however of long continuance*.

At this period of the disease, the muscles on the anterior part of the neck, and those which move the lower jaw upwards, begin to be affected, and by degrees becoming more violently contracted, close the teeth in such a manner, as to render the introduction of any thing solid impracticable.—This symptom gave rise to the term Locked Jaw.

The pain at the bottom of the *sternum* now becomes more frequent and fixed, and is attended with an evident increase of the spasms.—The muscles of the spine which were hitherto unaffected, now begin to contract, and bend the body strongly backwards. The extensors and flexors of the lower extremities are also now affected, and contracting simultaneously, render the legs rigid. In this situation the patient will spring up, and appear to rest entirely or in a great measure upon his head and heels†.

Although the extensors of the head and back are generally most affected; yet the muscles on the anterior part of the trunk and neck are frequently very violently contracted, particularly the *abdominal*, which sometimes become so rigid as to afford to the touch the sensation of a piece of wood.

In

* Cullen's Practice, vol. 2, page 148, A. E.—Girdlestone's Essay on the Spasmodic Affections in India.

† Hillarv.—Moseley.

In some instances also the muscles on the anterior part of the body; become so considerably contracted, as to counteract compleatly their antagonists, in such a manner, as to preserve the whole body rigidly extended. It is this form of the disease which is more properly called *Tetanus*.

In this state of the disease the muscles of the superior extremities become so much affected, as to produce a rigidity of the arms, and in some instances a clinching of the fists.

These spasms are every where attended with the most violent pains. The utmost force of spasm, is not however constant; for after subsisting for a minute or two, there is always more or less remission of the muscular contractions; though in no instance is it so great as to admit of the action of the antagonizing muscles.

This remission of the contraction is always productive of a remission of the pain; but neither is of long duration, as the violent contractions and pains are renewed sometimes every ten or fifteen minutes, and that often without any evident exciting cause.

In some instances however, every attempt to motion as the changing of posture, endeavouring to swallow, or even to speak, will give occasion to a renewal of the spasms; and in many instances with such violence that the patient is thrown entirely out of the bed‡.

The Pulse in general is either full and hard, or small quick and irregular, but is seldom more frequent than natural*; in instances however where the disease has proceeded from cold succeeding to heat, a fever with other marks of inflammatory diathesis are more considerable and

‡ Moseley on tropical diseases, page 470.

* Hillary's obs. p. 224, 226 — Chalmers, p. 93, 95.—Cullen's prac. p. 147. & 148. A. E. Akerman, Ed. Med. Com. 472. A. E.

and is sometimes according to Dr. Hillary attended with delirium*.

The breathing for the most part is short, quick and interrupted; and in some cases the heat of the body is increased while in others it remains perfectly natural†.

The blood when drawn rarely exhibits the inflammatory buff, but is very generally of a looser texture than usual, and does not coagulate as when natural; is of a less florid, or darker colour, and is sometimes covered with dark spots‡.

Deglutition is often entirely obstructed, and in most instances the bowels are obstinately costive.—The secretion of urine is also diminished; and what is discharged is very high coloured, and deposits much sediment.

Patients in this disease, very rarely become delirious to any considerable degree, until towards the close where it proves fatal; when every function of the system as well corporeal as mental, undergoes the most complete subversion, from the repeated and continued violence of this excruciating and dreadful disease.

It is perhaps unnecessary to observe here, that in this disease, the patient is so far from being able to perform any voluntary action, that the influence of the will over the organs of voluntary motion, is completely suspended, in most instances of its occurrence.

Where the disease terminates in death it is generally on some day, before the seventh: but its termination in health

* Hillary's obs. 226.

† Cullen's Practice.

‡ Hillary's obs. p. 226. Cullens Pract. p. 148. A. E. Chalmers. p. 96. Akerman. Ed. Med. Com. p. 472. A. E.

health is frequently protracted for three or four weeks or more; is generally very gradual, and without any particular crisis*.

From the very peculiar and striking symptoms of this disease there is little danger of its being confounded with any other; it will therefore be unnecessary to treat of the diagnosis: and this the rather, for this further reason viz. That all the diseases, which possess any similarity to *Tetanus* in their appearance, are generally of the same nature and require nearly similar remedies.

With respect to those who are most subject to this disease Dr. Cullen has asserted, that altho' it may attack persons of all ages yet it appears to attack those of a middle age more frequently than the older or younger, the male sex more frequently than the female, and the robust and vigorous more frequently, than the weaker†.

Nor does it appear to be confined to the human species, since we find instances recorded of its having occurred in horses‡.

The frequency of this disease among the Negroes in the West-Indies has been ascribed by some Physicians, and among others by the industrious Dr. Moseley§ to a superabundance of irritability which it has been imagined the Negroes possess. That the Negroes do however possess an accumulated irritability is improbable from the following reasons:

1st. They do not suffer more frequently than the whites, from the great exposure to a hot sun, severe exercise

* Hillary's obs. p. 225. Cullen's prac. p. 150. A. E.

† Cullen's Prac. p. 144. 145. A. E.

‡ Rush's 1st. vol. Med. Inq. Moseley on Tropical Dis.

§ Tropical diseases, head *Tetanus*.

ercise or labour, deprivation of rest, &c. nor from the general abuse of what are called the non-naturals.

2nd. Unless we can suppose that increased irritability in the muscles (properly so called) can exist without a considerable degree of it in the muscular fibres of the system of blood vessels, how can we account for the notorious infrequency of fevers of every kind amongst them? That they are much less disposed to fevers particularly to that grade called the Yellow Fever is granted on all hands. How can this happen if their irritability be preternatural?

And 3d. Because it is highly probable that they would more frequently suffer than they do, from wounds, amputations, and the variety of accidents to which they are necessarily exposed, did they possess that constitutional superabundance of irritability which appears to be so materially concerned in the production of fever from local injuries, as this appears always to be of a degree of violence proportioned to the constitutional sympathy, and this last again in a degree proportional to the irritability existing at the time.

These considerations have induced me to relinquish Dr. Moseley's opinion, with respect to superabundant irritability; and I would ascribe the frequent appearance of *Tetanic* complaints amongst the Negroes rather to the more frequent exposure to many of its causes, to wit, Wounds, Burns, Heat, Cold, Fatigue, and the like.

OF THE PREDISPOSING CAUSES.

COLD has long been known to possess considerable agency in the production of *Tetanus*, but in what manner it acts is not however as yet decided.

It is now generally known to be a negative quality; and of course cannot directly or positively produce any effect: though indirectly it is not infrequently productive of very many as well hurtful as salutary. In the present instance I am inclined to adopt the opinion of Dr. Rush, *viz.* that it acts only by producing a state of debility which may favour the action of the exciting causes to be hereafter mentioned*.

That this is its mode of operation I infer from, there being no instance on record of the disease being produced from exposure to cold without the intervention of some more active agent, as preceding heat, wounds, stimulants taken internally, &c. Did cold possess an absolute operation in the production of *Tetanus*, would it not *ceteris paribus* appear more frequently in winter than summer.

It is farther probable from the notorious fact, that the application of cold predisposes to fevers of every kind.

Severe exercise or labor as they produce muscular debility do most certainly predispose to the present disease, hence we find *Tetanus* more frequently occurring from wounds received in battle than at any other time†.

That they do this is also farther proved by the greater frequency of cramps in the muscles of the thighs, legs, &c. after they have been previously weakened by long walking, swimming, or the state of sleep. This is no doubt a principal cause of the frequent occurrence of the disease amongst the hard labouring negroes of the West-Indies and the southern part of the United States.

It

* Hence Dr. Blane observes that those wounded men who were most exposed to a current of air were most liable to *Tetanus*. Blane on seamen,

† Rush's Med. Inq. & Ob. vol. I.

It will surprise some perhaps to find the directly opposite of cold, viz. heat enumerated as one of the predisposing causes of this disease; that heat possesses considerable influence in some way or other in the production of *Tetanus* has long been observed, but the true cause of this influence was perhaps never rightly explained until within these few years. Our illustrious Professor Doctor Rush, appears to have judged very properly, when he ascribes this influence of heat to its debilitating effects*. That heat produces debility, and that of the indirect kind, is too incontestible a fact to need any illustration.

To these causes may be added excess in venery, want of rest, excess or deficiency of aliment, and indeed every thing which tends to produce debility.

From what has been said it may be inferred that debility whether direct or indirect, constitutes the predisposition to this disease; this debility does not however appear to be general, but from some reason or other to be seated particularly in the muscles.

That the debility in this instance does exist particularly in the muscles we infer from their being almost exclusively affected; for were this morbid predisposition or debility equal in every part of the body we should have universal disease; as many of the occasional causes of *Tetanus*, are most evidently, such as frequently produce sever when aided or preceded by the requisite predisposition.

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The

* Medical Inquiries, vol. I. page 242.

OCCASIONAL OR EXCITING CAUSES.

THESE as far as we know are, *first* wounds of every kind; as well of muscular as tendinous or nervous parts; and particularly such as are made by gun-shot.*

The distance of time from the infliction of the wound to the appearance of the disease, is extremely various, it having appeared in some instances in two or three days, and in others after several weeks have elapsed, and the wound had healed.—In cases of the last kind the appearance of this disease when it was not to be expected has been attributed by Dr. Rush to the retention of acrid particles in the wounded part†.

The cutting of the umbilical cord, is accused of frequently producing that form of the disease called the *Trismus noscentium* by the practitioners in warm climates‡.

Burns not unfrequently produce *Tetanus* of which I have lately seen an instance in the Pennsylvania Hospital.

2nd. In compliance with custom I shall here mention cold, as an occasional cause of *Tetanus*—That the disease has in many instances, very suddenly appeared after imprudent exposure to cold is not to be controverted; it is also equally incontrovertible, that cold never produces *Tetanus* by a direct or positive operation, and I would rather ascribe the origin of the disease in these instances to the sudden diminution of the excitement and the immediate predisposition thereby induced to convulsive and inordinate action, upon the impression of almost any stimulus.

May

* Nor does it appear that painful injuries are more liable to produce *Tetanus* than those which are more trivial particularly in the hands and feet.—Doctor Rush informed me of a singular instance where the disease was occasioned from cutting a corn off a toe.

† Rush's Lectures.

‡ Transactions of the College of Physicians of Philadelphia, vol. 1. p. 1.

May not the muscles in these instances fall into convulsive or wrong action, from the influence of what Mr. Hunter has called the stimulus of imperfection; in the same way as rendering complete cavities incomplete, induces inflammation, and as sudden and copious depletion in some instances produces convulsions? It is only upon some such principle as one of the foregoing, that these effects from the application of cold can be explained.

3d. Heat is also supposed by many to be a frequent occasional cause of *Tenatus**.

4th. Terror, is enumerated by Dr. Rush among the exciting causes of this disease, who informs us in his lectures that he knew of a case from this emotion in this city.

5th. This disease is supposed to be frequently induced in infants, by acrid matters in the intestines particularly by the retained meconium†.

6th. It has been induced by drawing of teeth‡.

7th. It has been in several instances the consequence of eating the narcotic vegetables, particularly the hemlock-dropwort, and the stramonium§.

8th. It has been the consequence of the bite of some of our poisonous serpents||.

9th. It has been in some instances the effect of parturition¶.

10th.

* Rush, vol. I. *Medical Inquiries and Observations*.

† Hillary's Observations.—Chalmers.

‡ Rush's Lectures.

§ Barton's & Rush's Lectures.

|| Barton's Lectures.

¶ Moseley on 'Tropical diseases, p. 477.—Rush's Lectures.

10th. It has sometimes appeared as a symptom of *Hysteria**.

And 11th & lastly. As a symptom of *Bilious Fever*, *Gout* and *Hydrophobia*†.

To these we may also add ardent spirits‡, marsh miasma, or indeed stimuli of any kind§. A consideration of the effects of most of the above causes will convince us that they prove injurious, in consequence of a stimulant operation unequally determined to certain parts from their greater disposition to receive impression; this unequal determination unquestionably exists in the muscles in the present disease, as we may infer from their being principally affected.

Having now considered every circumstance essentially pertaining to the history of *Tetanus*, I shall before I treat of its cure briefly attend to its *Pathology*, *Prognosis*, and *Prophylaxis*.

In attempting the investigation of the *pathology* of *Tetanus*, I am fully apprized of the difficulties which envelope the subject, and of the little assistance to be derived from the present imperfect state of our knowledge with respect to the *pathology* of muscular affections.

To relinquish an enquiry however on account of its apparent intricacy would be equally unphilosophical and unfriendly to the extension of science. In the first place then we may observe, that the disease consists of an uniform spasmodic contraction of the muscles either partial, or general throughout the body, which therefore as producing the *Phenomena* of the disease, we shall call its proximate

* Rush's *Medical Inquiries*, vol. 1, p. 253.

† Rush's *Lectures*.

‡ Girdlestone's *Essay*.

§ Rush's *Medical Inquiries* 4 vol.

proximate cause. This Spasmodic contraction of the muscles is of the kind called by Nosologists tonic or fixed in contradistinction to those called Clonic Spasms; the last alternating with relaxation and constituting what are called convulsions.

An explanation of the peculiar *Modus Operandi* of the exciting causes, in the production of this disease has long been held as one of the *desiderata* of Medical Science and although the Physicians of the present day have in a remarkable manner, discovered an attachment and fondness for Pathological enquiry and speculation; yet there are very few who have attempted an explanation of this curious problem.

Lately indeed the very ingenious Dr. Darwin* has attempted an explanation of the production of Spasm, and he has as I conceive with more ingenuity than correctness resolved them into the effects of original voluntary efforts to remove or lessen some disagreeable sensation, accounting for their recurrence upon the principle of an acquired association.

How far or how justly the speculations of this gentleman will apply to the explanation of the primary production of spasmodic diseases, generally, I cannot with my small experience pretend to determine; with respect to their application in the present instance however, suffice it to observe that they appear inadmissible, and inadequate to the purpose, for the following reasons.

1st. This disease has occurred in many instances particularly from wounds after these last were entirely healed up and no disagreeable irritation or sensation from thence was observed to exist, as far as we can discover.

2d.

* *Zoonomia.*

† Hillary p. 222. Akerman Ed. Med. Com. p. 471. A. E. 8

2nd. This disease has commenced during sleep. A state of all others we would suppose the least favourable to sensation, or to the exertion of voluntary efforts*.

3d. Was the production of *Tetanus* to be explained upon this principle, we would expect to find it occurring while the irritation was at the greatest height; and again we would expect that these voluntary efforts would be directed particularly to the seat of the primary irritation. This however is far from being the case.

4th. We cannot comprehend how irregular and inordinate muscular contraction, can ever answer the purpose of removing this disagreeable sensation, or the impression which is supposed to excite it.

5th. Because it supposes the mind to possess a power over the body which does not appear admissible or indeed probable. Were we to admit that the mind by its volition can induce spasm in one set of muscles we might by a parity of reasoning suppose that it could also produce relaxation when it had discovered the insufficiency of its efforts (to which I suppose the mental Pathologists would not deny its being adequate;) this doctrine is farther exceptionable in as much as it implies a degree of consciousness and intelligence with respect to diseased actions, and their cause; which we are perhaps never sensible of and the existence of which we have no reason as yet to believe.

6th and lastly. Children are subject to spasm, before they possess mind enough to act in the manner asserted by Dr. Darwin.

Of the numerous Pathologists of the present age, perhaps no one has carried his researches farther, or has applied

* *Essay on the Spasmodic affections of India* by Girdlestone.

applied his reasoning to the explanation of the appearances of diseases with more success and indefatigable zeal than our professor of the institutes of Medicine, and perhaps he has contributed more to the simplification of Medical Theory than any of his predecessors or contemporaries.

In the 4th. vol. of his enquiries we find *Tetanus*, as a misplaced state of fever; and as far as any affection not immediately seated in the blood-vessels is entitled to this appellation, does the application of this term to the present disease appear just.

Confining the term fever exclusively to the affections of the sanguiferous vessels, comports rather with the exactness and precision of the critical and speculative Nosologist, than with the expanded and comprehensive mind of a Philosophical Physician.

A more accurate attention to diseases will perhaps discover that the mode of action is the same, let it be where it will: viz. Irregular, wrong or convulsive action, and we would be led to explain the difference of diseases rather upon some circumstance or property peculiar to the part affected, than upon a supposition of there being absolutely any specific variety of the same diseased action, as appearing in different parts as bone, muscle, artery, &c*. Be this as it may, we well know that the same stimuli which produce *Tetanus*, do very frequently produce, convulsive or inordinate action of the arteries, or fever, when they are aided by arterial vibratility or irritability.—And I cannot think, that it is going at all too far to suppose that the same causes applied to the body labouring under increased

* I do not pretend to deny that diseased actions are not different according to the specific stimulus by which they are excited. This however would produce the same action in muscle, bone, &c. as in the arteries or lymphatics were they as susceptible of impression and possessed similar dispositions.

increased muscular irritability, or predisposition, will produce irregular, inordinate, or convulsive action in the muscles; and in fact the disease in question. This we are farther warranted in believing, since in each instance these stimuli act upon matter of the same nature viz. muscular fibres.

I am well aware that, it may be demanded, how I explain the manner in which these causes, come to act particularly on the muscles: and this I would explain upon their possessing at the time a greater susceptibility of impression than any other part of the body.

With respect to the application of these exciting causes, as whether they must be locally applied to produce a disease in a particular part, as the muscles, or not, I cannot determine. I am however inclined to believe that most hurtful agents, produce their effects, by a general operation, on the whole system, and that the exclusive affection of either arteries, nerves, or muscles is to be explained upon the existence of increased irritability.

In forming a prognosis of *Tetanus* we are to be guided *first* by the causes which induced it: *Secondly*, by the violence with which it attacks: *Thirdly*, by the length of time which it has existed: And *Fourthly*, and lastly, by the situation of the patient at the time present.

1st. Those cases which arise from wounds are generally more fatal than those from any other cause*.

Hippocrates observes that Spasms from wounds are generally fatal†, and Moseley asserts that he never saw a patient recover who had a complete *Tetanus* after an operation‡.

2nd.

* Cullen's Pract. p. 149. A. E.

† Aphor. 2nd. Sect. 5th.

‡ Moseley on Trop. dif. p. 481.

2nd. The disease is generally fatal in proportion to the rapidity and violence of its attack||.

3d. Those cases are favourable where the disease is protracted beyond the fifth day, although there are some instances of its fatality after the tenth§.

4th. Cold extremities and a clammy moisture or sweat are generally supposed to portend death¶; whereas, a fever with a white tongue, and a plentiful discharge of urine are thought to foretel a favorable issue†.

PROPHYLAXIS.

THERE are very few diseases perhaps so certainly prevented in their forming state as *Tetanus*, and to this period of the disease we should be particularly attentive.

As most of the causes productive of *Tetanus* are more frequently productive of other diseases, than of it; so we find little said, or indeed little could be said with respect to the use of any prophylactic remedies, between the application of the exciting causes and the beginning of the disease, as most of these are generally so very obscure in their operation, as to render this last insensible to us, until they are about to induce the disease.

This obscurity however, very happily for mankind does not exist with respect to one of the most frequent and dangerous causes of this disease, viz. wounds, however it may be explained, it is the undeniable result of experience, that this disease is most frequently the consequence of such wounds as have healed, without the intervention of much inflammation: and it is equally true,

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|| Chalmers' Lon. Med. Obs. Inq. vol. 1st. pa. 92. Cul. prac. p. 149.

¶ Hillary's obt. p. 225. Chalmers. Cul. prac. p. 149. A. E.

§ Girdlestone's essay on the Spas. dis. of Ind.

† Moseley on trop. diseases.

on the other hand, that a considerable inflammation in them either natural or artificial, is one of the surest preventives of a *Tetanic* affection†. In such wounds therefore as we have any reason to suspect will produce *Tetanus*, we are to excite inflammation and suppuration. By 1st. making incisions into the wounded part, 2nd. applying various stimulants as oil of turpentine, common salt, lime juice, &c. and 3dly. by the subsequent application of hot poultices*.

As we can never act with propriety in doing any thing with the intention of preventing *Tetanus* from its other causes, before we perceive some of its symptoms; we are to be particularly attentive to those which may be called the precursors of the disease, viz. pain and stiffness of the neck and fauces; a disagreeable sensation at the root of the tongue, and starting from sleep. Whenever these symptoms occur the disease may be almost uniformly prevented by the use of opium and other stimulants, as bark, wine, &c. and by the application of acrid stimulants, or what I would prefer, caustics, to the wounded part, when it proceeds from that cause.

Having said as much with respect to the prevention as experience and reasoning on the subject will justify, we proceed to the treatment of the disease after its complete formation.

C U R E.

THE indications of cure are I. to lessen or abstract the irregular and diseased excitement of the muscles—by 1st. blood letting, 2nd. emetics, and 3d. purgatives—and II. after sufficient depletion to remove or overcome the diseased action by tonic remedies. These are 1st. Opium
2d, Bark,

† Rush's Med. Inq. and Ob. vol. I.—Moseley Trop. Dis.

* The *Tetanus* is said to be much less frequent in the West-Indies since the general use of these applications,

2d, Bark, 3d, Wine, 4th, oil of Amber, 5th, cold and hot bath, 6th, Mercury, of each of which I shall speak in the order in which they are mentioned, and *first*, of

BLOOD-LETTING.

The use of evacuations in spasmodic affections, is by no means of modern invention, as we find them mentioned by *Hippocrates** and *Galen*†, as being essentially necessary in all cases of spasm not immediately depending on inanition.

Although most of the modern practitioners have precluded the employment of blood-letting in *Tetanus*, there are nevertheless some who have used it in particular instances, and there are not wanting facts to establish its propriety: indeed, had the remedy nothing from experience to recommend it, it would yet be worthy of a trial as being manifestly harmless in diseases of this kind, and there are very few as far as I know who accuse it of being injurious.

Dr. Chalmers recommends it upon the supposition of its facilitating the operation of opium and the warm bath‡; and we are told by Dr. Moseley that it is very extensively used by the Spanish Surgeons in the colonies, and that immediately after it, they exhibit an emetic and then considerable quantities of Theriaca. At the same time they use extensive scarifications§.—We also find it recommended by the experienced Dr. Hillary in cases arising from cold||.

In addition to these recommendations of the remedy it may be observed, that it has been successfully used in
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* Aphor. 22. Sect. 2nd.

† Lib. 12. Chap. 8th. *Mitbodi Medendi*.

‡ Chalmers. Lon. Med. obs. & Inq. vol. 1st. p. 102.

§ Moseley on Tropical dis. p. 499.

|| Hillary's obs. p. 239.

one instance recorded by Mr. Alexander of Edinburgh where the disease was very violent†: and that it has been used with the happiest effect in three cases by Dr. Mackey, a practitioner of eminence in Virginia, as appears from a letter to my friend Mr. Hubbard, a copy of which he has favored me with*.—The propriety of this remedy is proved farther by 1st. The pulse which is very frequently full and hard.

2d. By the relief, which it affords in other instances of spasm, as in the spasmodic contraction of the bowels in Colic and in the spasms sometimes attendant on Hysteria. 3d. By its known effect in producing general relaxation, as exemplified in syncope and in facilitating the reduction of luxations and fractures.

4th. By the appearance of the blood before mentioned being now acknowledged, as characteristic of Phlogistic Diathesis. 5th. By its very great utility in an extremely analogous disease, viz. Hydrophobia. It should therefore be employed in all instances in the early stage of the disease or where there was not so much arterial debility as to render it inadmissible. I

† Treatise on the Croup, page 65. In this case the usual remedies had been unsuccessfully used.—Dr. Barton has likewise informed me of a case which he treated successfully by the use of the lancet; and I find another recorded by Dr. Currie in the 3d. vol. of the Lon. Med. Mem. p. 155.

“ *Winchester, May 2d, 1793.* ”

* “ SIR,

“ I received yours and can inform you, that I succeeded in three cases of “ *Tetanus*, by using the depleting system, venæsection, purgatives, and nau-“ seating doses of *Tartar Emetic*. In one patient the constipation of the “ bowels was such that I could not remove it by purgatives or clysters, 'till “ I gave one of *tobacco tea*, (I had no way of using the smoke) this produ-“ ced a nausea and dreadful sickness, which I feared would have put an end “ to his existence, but completely removed the constipation of the bow-“ els and in a great measure the *Tetanic* symptoms, and he was restored by “ cordials, opium, wine, &c.

“ The patients were all healthy and strong, and had no evacuation be-“ fore I visited them. This treatment would certainly be improper in pa-“ tients who have been reduced by gunshot wounds and great loss of blood; “ but in such I would suppose opium and other cordials most proper: “ though I have seen these used very freely in two cases, I am sorry to say “ they were not successful.

“ I am, &c.”

I should also use a large evacuation at a time as it would probably be most beneficial in producing relaxation, and as a considerable evacuation has been found most successful in those instances wherein it has been employed.

E M E T I C S.

In mentioning these as a remedy for *Tetanus* I have been influenced rather by facts and reasoning than the authority of writers. When we consider that Emetics operate as a sedative and equalizer of excitement (if I may be permitted to use the term) and that the disease consists principally in increased and partial excitement, we cannot hesitate to admit that they at least deserve a trial.— In confirmation of their utility Dr. Rush has informed me that he has removed two incipient cases of the disease by their use; and I should most certainly prescribe them in all such instances, but particularly in those arising from cold and attended with fever.

P U R G A T I V E S.

With a view of producing evacuation and thereby the removal of any acrid matter that might be in the *præ viae* as well as revulsion or counteraction; we may very usefully have recourse to *Cathartics* of an active kind and such as will produce considerable irritation*.

Doctor Moseley informs us that they were much used by Barrere a French Physician at Cayenne and with success.—The propriety of these as a remedy in *Tetanus* is farther proved by their utility in *Trismus Nascentium*¶, which

* With this intention acrid Glysters have been recommended, and we are informed that injections of Tobacco smoke, have been successfully used in a case of this disease, by Dr. Martin of German-Town.

§ Trop. dis. p. 494.

¶ Hillary's ob.—Chalmers.

which is only a lower grade of the same disease. They should therefore not only be employed in the beginning for the purposes above mentioned; but in the more advanced stage to obviate costiveness.

II. The tonic remedies for removing the diseased action by exciting another action superior to it in force are, *first*,

OPIUM.

This remedy has been more generally used and extolled in *Tetanus* than any other, so much so indeed, that very many have depended entirely on it for a cure.

Although it has been so universally recommended, and indeed used, there are many proofs of its ineffectualness. To obtain the greatest benefit from this remedy we might very advantageously use blood-letting previously to its exhibition. In this manner by lessening the excitement we enable the opium, the more easily to institute its own action. It should be given freely and repeated as often as the violence of the disease might require.

Dr. Chalmers gave as much as 200 drops of *Tinct. Opii.* at a dose every 2 or 3 hours; and frequently an ounce or more in 24 hours, without producing the sleep or torpor which usually attend its exhibition*. These large doses however should never be commenced with.

Perhaps from the known transitory stimulant effects of this medicine†, we would derive more benefit from it when combined with some more durable stimulus, and accordingly we find it very highly recommended by Dr. Girdlestone‡ in conjunction with Madeira wine. Opium has been also used in the form of plaster either to the jaws

* Dr. Moseley says the stomach will sometimes bear a dram of opium taken every hour for two or three days together.—'Tropical Diseases,' p. 486.

† Crampe on Opium.

‡ Essay on the Spas. Dis. of India.

jaws or feet, and of the good effects of such a mode of application there are many proofs on record. In these instances it has been in general combined with Camphor or the fetid gums§.

Though many have condemned this mode of using opium as entirely useless, yet as it has been found serviceable and active in other instances when externally applied, I see no reason for precluding its use in the present, nor have I any, for extolling it.

In addition to these methods we may also exhibit it very advantageously in the form of enema; with this difference however, that in this way it is to be used in a double or perhaps greater quantity||.

BARK & WINE.

The first of these has been long since found serviceable in spasmodic diseases depending on what has been called *mobility*. As it must operate as an incitant though under a particular modification, it will of course be equal to the cure of all diseases consisting of an action of less force than the one which it excites; therefore as being a durable as well as a powerful stimulant, it may be advantageously used in conjunction with such as are more diffusible, though less durable, in cases of *Tetanus*, of weak action, or after this has been lessened by previous depletion, and particularly in the intermissions of the spasms, if any such occur.

Wine, as a powerful diffusible and somewhat durable stimulus may be properly used and in a considerable quantity, in conjunction with bark*.

OIL

§ Lind on Hot Climates, head *Tetanus*.—Chalmers.—McCaulay's paper, Lon. Med. Inq. Obs. vol. 2d.

|| This mode of exhibiting opium, as well as other remedies, is particularly useful in cases of difficult or impeded deglutition.

* Vide Rush's Medical Inquiries and Observations, vol 1st. London Medical Mem. vol. 3, art. 12th, on the use of Bark and Wine.

OIL OF AMBER.

This medicine acts particularly on the muscular system, according to Dr. Rush†. Whether this be admitted or not, we have every reason to believe it has been very usefully employed in *Tetanus*; to be serviceable it must be given in large and frequently repeated doses‡.

COLD BATH.

This remedy was used by *Hippocrates* with a very just view, viz. to excite an action in the arterial system; which he informs us generally cured the disease†. Since his time, it has been used and recommended by many, particularly Drs. Wright‡, Moseley§, and Currie||. In the use of this remedy we are to be cautious not to employ it when the debility is great, as in such cases a re-action will not take place, and the remedy would prove rather injurious than otherwise; neither can it be used with a prospect of much advantage where the disease is attended with considerable arterial action, and in all such instances we are to precede its use by evacuants. It is owing probably to an inattention to these circumstances that this remedy appears to have gone somewhat into disuse in many parts of the West-Indies.

WARM BATHING.

This is highly recommended by Dr. Chalmers but does not appear to have ever come into general use; indeed it has been condemned by some, particularly Dr. Hillary, who says that he has seen patients die immediately after coming out of the bath. As this remedy acts only in consequence of the stimulus it affords, we are never to use it except in cases of weak action.

In

† MS. Lectures.

† Rush's Medical Inquiries, vol. 1.

† Aphor. 57. sect. 4.

‡ London Medical Essays, vol. 6th.

§ Tropical Diseases.

|| London Med. Mem. vol. 3. art. 12/h.

In cases of the last kind indeed it may be used when the cold bath from its indirect mode of operation would be inadmissible, and these are the only instances as I conceive in which we can expect any advantage from it,

After the use of either the cold or hot bath, frictions with dry flannels are highly proper.

With an idea of producing relaxation many have recommended the application of fomentations and we are told that they have been successfully employed*.

M E R C U R Y.

When we consider the operation of this remedy viz as a very general and powerful stimulant, acting particularly however on the arterial and lymphatic systems, its propriety in that state of this disease in which incitants are to be used will be at once admitted.

Although the use of Mercury in the present disease has been strongly condemned by Dr. Moseley yet there are not wanting many facts to prove its utility†; and we have only to lament that it is too often so difficult to excite a salivation, that the disease frequently terminates before this effect can be produced. I would therefore in every instance have immediate recourse to Mercury in conjunction with other remedies, to be introduced by the mouth or skin in such quantities as to affect the gums as speedily as possible.

Might not puking with vitriolated Mercury be of service? This mode of exhibiting this medicine has been found very speedy in producing ptyalism in other instances in addition to these we might probably derive advantage from the use of Mustard or Garlic and from that of Electricity. Of the efficacy of the last remedy there is one case upon record, but the difficulty of obtaining and applying it, should lead us to depend upon more practicable and cheaper remedies.

* Hillary's obs.

† London Medical Memoirs article 12. Measles Inaug. Diss. page. 125.

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